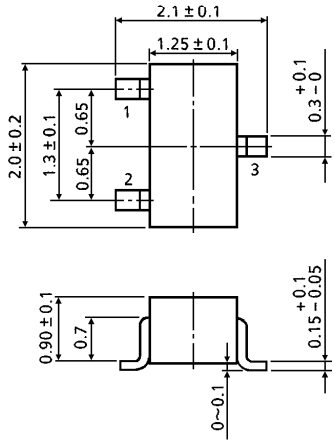
TOSHIBA TRANSISTOR SILICON NPN EPITAXIAL PLANAR TYPE

2SC4321

VHF~UHF BAND LOW NOISE AMPLIFIER APPLICATIONS

Unit in mm



1. BASE
2. EMITTER
3. COLLECTOR

JEDEC	—
EIAJ	SC-70
TOSHIBA	2-2E1A

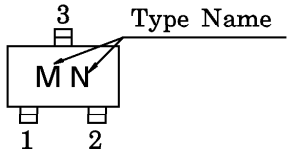
Weight : 0.006g

- Low Noise Figure, High Gain
- NF = 1.1dB, $|S_{21e}|^2$ = 13dB (f = 1GHz)

MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	RATING	UNIT
Collector-Base Voltage	V_{CBO}	20	V
Collector-Emitter Voltage	V_{CEO}	10	V
Emitter-Base Voltage	V_{EBO}	1.5	V
Base Current	I_B	20	mA
Collector Current	I_C	40	mA
Collector Power Dissipation	P_C	100	mW
Junction Temperature	T_j	125	°C
Storage Temperature Range	T_{stg}	−55~125	°C

Marking



MICROWAVE CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Transition Frequency	f_T	V_{CE} = 8V, I_C = 20mA	7	10	—	GHz
Insertion Gain	$\|S_{21e}\|^2$ (1)	V_{CE} = 8V, I_C = 20mA, f = 1GHz	10	13	—	dB
	$\|S_{21e}\|^2$ (2)	V_{CE} = 8V, I_C = 20mA, f = 2GHz	—	7	—	
Noise Figure	NF (1)	V_{CE} = 8V, I_C = 5mA, f = 1GHz	—	1.1	2.5	dB
	NF (2)	V_{CE} = 8V, I_C = 5mA, f = 2GHz	—	1.7	—	

ELECTRICAL CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Collector Cut-off Current	I_{CBO}	V_{CB} = 10V, I_E = 0	—	—	1	μA
Emitter Cut-off Current	I_{EBO}	V_{EB} = 1V, I_C = 0	—	—	1	μA
DC Current Gain	h_{FE}	V_{CE} = 8V, I_C = 20mA	50	—	250	—
Output Capacitance	C_{ob}	V_{CB} = 10V, I_E = 0, f = 1MHz	—	0.65	—	pF
Reverse Transfer Capacitance	C_{re}	(Note)	—	0.45	0.9	pF

(Note) C_{re} is measured by 3 terminal method with Capacitance Bridge.

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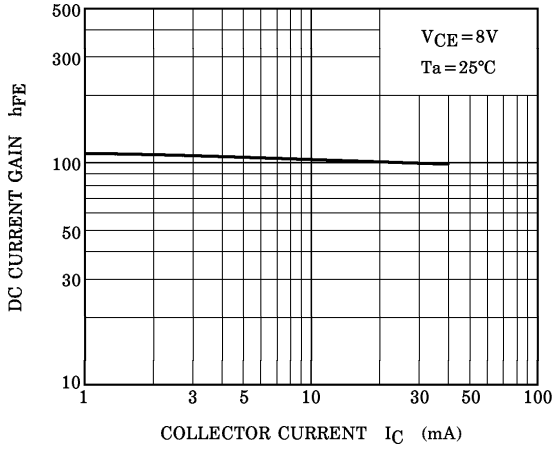
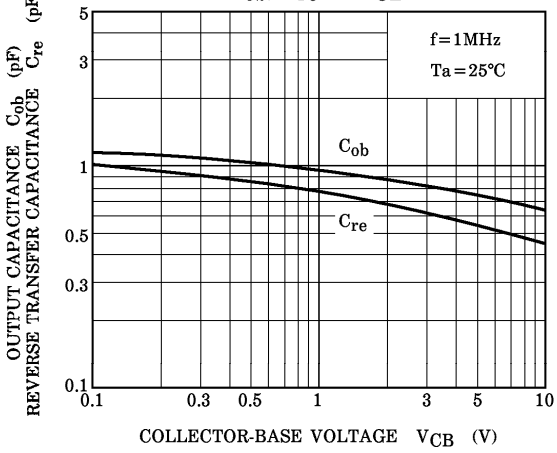
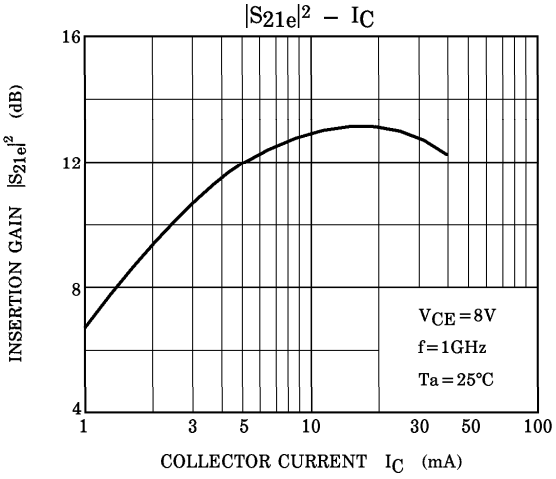
h_{FE} – I_C



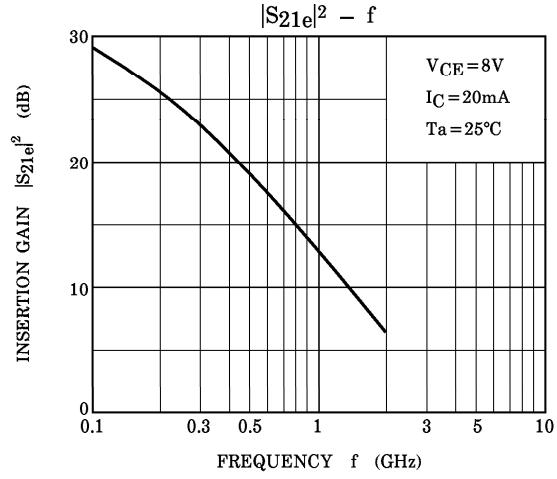
C_{ob}, C_{re} – V_{CB}



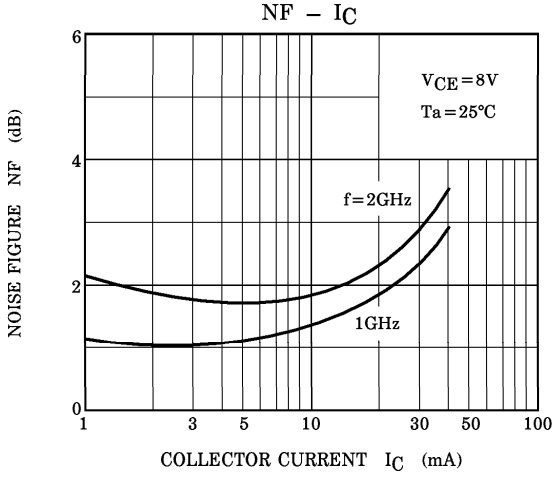
$|S_{21e}|^2$ – I_C



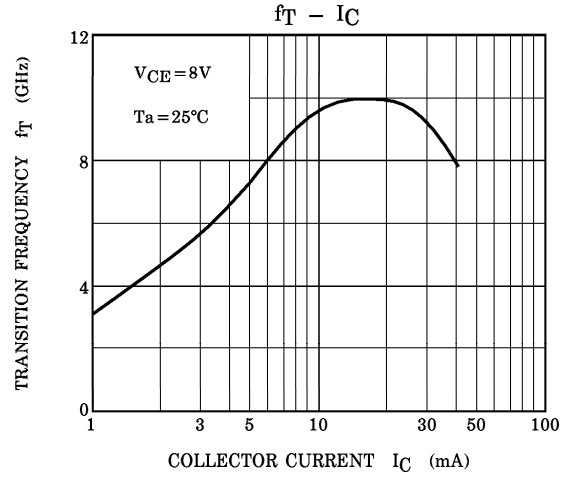
$|S_{21e}|^2$ – f



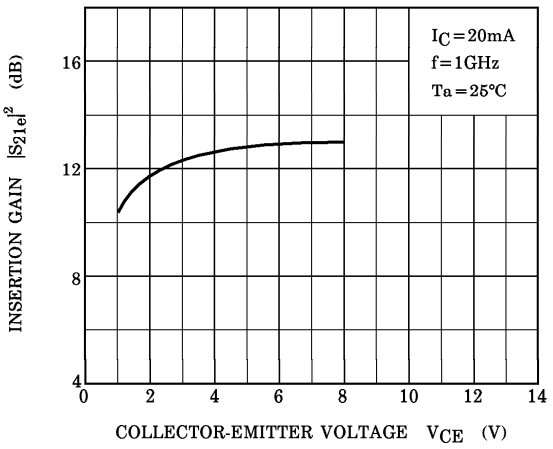
NF – I_C



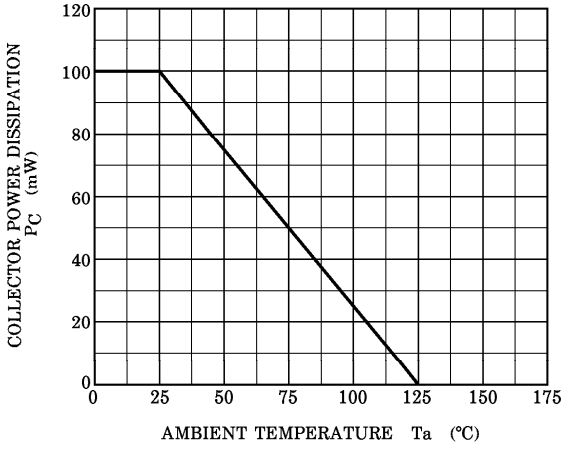
f_T – I_C



$|S_{21e}|^2$ – V_{CE}



P_C – Ta



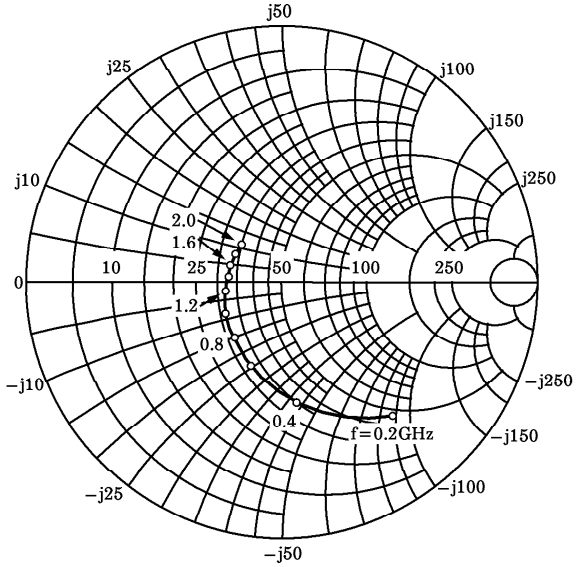
S-PARAMETER $Z_O = 50\Omega$, Ta = 25°C
V_{CE} = 8V, I_C = 5mA

FREQUENCY	S11		S21		S12		S22	
MHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
200	0.680	−49.6	11.448	140.0	0.048	67.0	0.820	−28.4
400	0.478	−83.2	8.076	116.6	0.073	59.6	0.613	−41.1
600	0.353	−108.3	5.992	102.7	0.092	59.1	0.495	−46.2
800	0.281	−129.2	4.711	93.0	0.109	60.1	0.428	−48.9
1000	0.240	−149.0	3.875	85.8	0.127	61.1	0.389	−51.0
1200	0.216	−169.1	3.294	79.6	0.146	62.1	0.364	−53.3
1400	0.202	175.1	2.876	73.8	0.166	62.6	0.350	−55.6
1600	0.194	158.9	2.572	69.0	0.186	62.6	0.339	−58.4
1800	0.193	142.9	2.349	64.5	0.207	62.4	0.332	−61.7
2000	0.202	130.9	2.128	61.1	0.227	62.3	0.325	−65.7

V_{CE} = 8V, I_C = 20mA

FREQUENCY	S11		S21		S12		S22	
MHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
200	0.332	−83.7	18.406	118.0	0.034	68.8	0.565	−38.2
400	0.212	−123.3	10.378	100.0	0.057	71.1	0.393	−39.9
600	0.173	−150.7	7.130	90.7	0.080	73.0	0.336	−39.3
800	0.157	−175.3	5.442	84.3	0.104	73.0	0.309	−39.6
1000	0.161	167.5	4.394	79.1	0.128	72.4	0.295	−41.0
1200	0.162	149.7	3.728	74.3	0.152	71.7	0.285	−43.2
1400	0.169	138.2	3.240	69.5	0.175	70.5	0.280	−46.0
1600	0.177	125.9	2.877	65.7	0.200	68.9	0.278	−48.9
1800	0.178	113.5	2.595	61.8	0.223	67.4	0.279	−53.0
2000	0.190	104.3	2.352	58.6	0.246	65.8	0.275	−57.8

S_{11e}
V_{CE} = 8V
I_C = 5mA
Ta = 25°C
(UNIT : Ω)



S_{21e}
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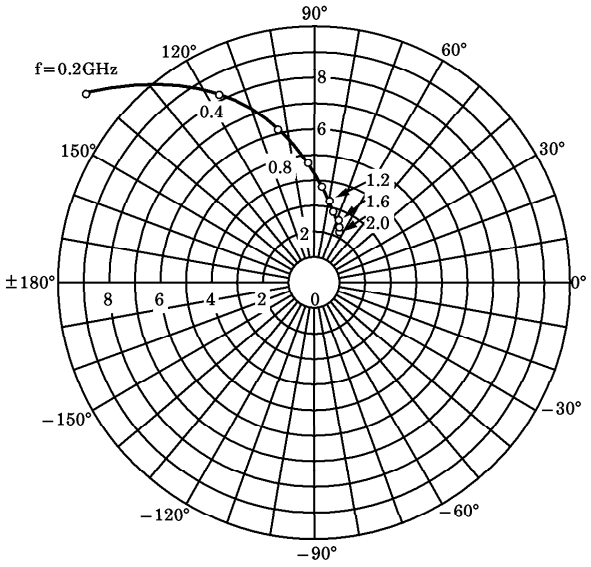

S_{12e}
V_{CE} = 8V
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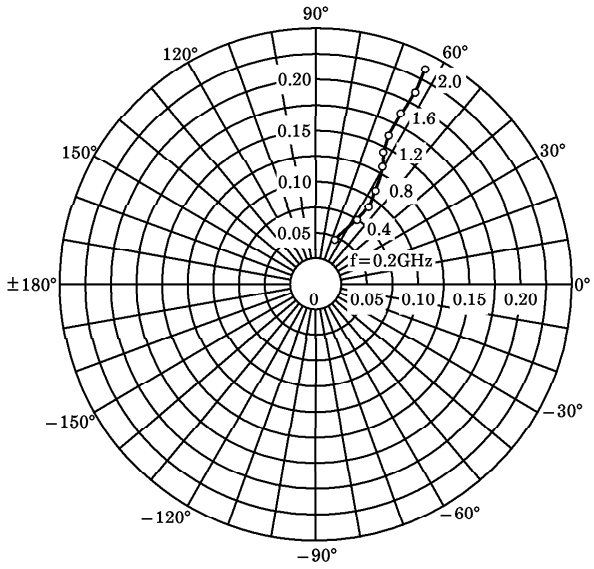

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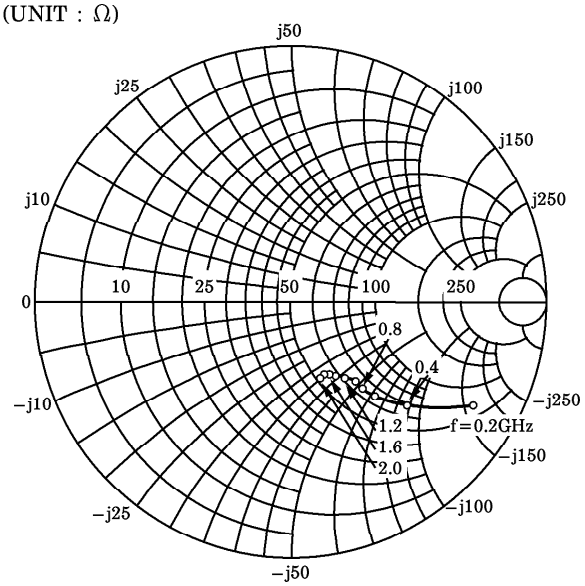

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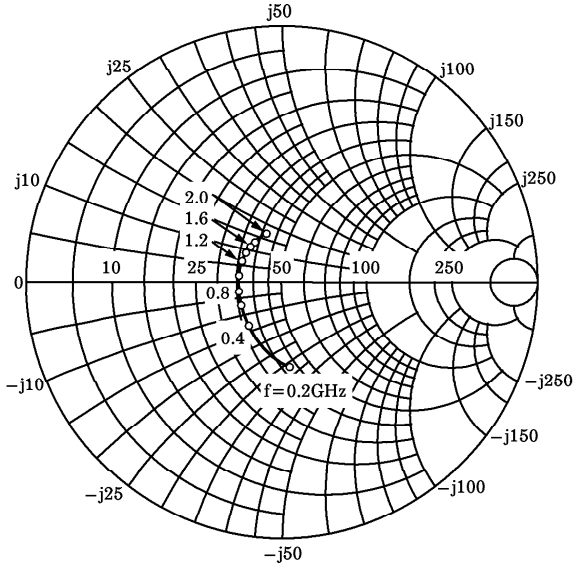

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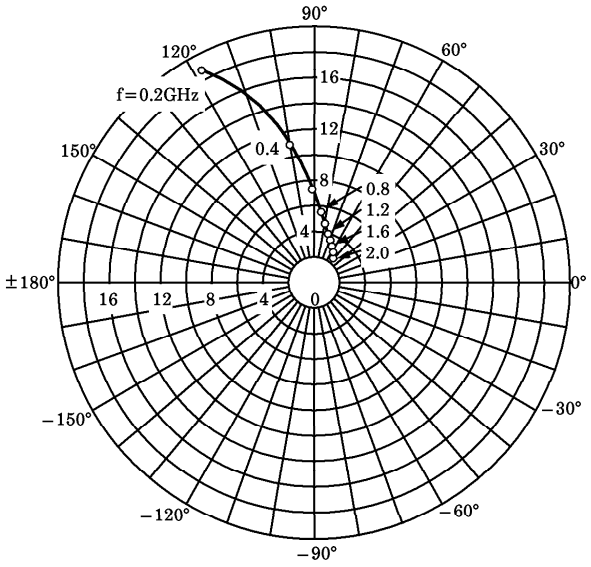

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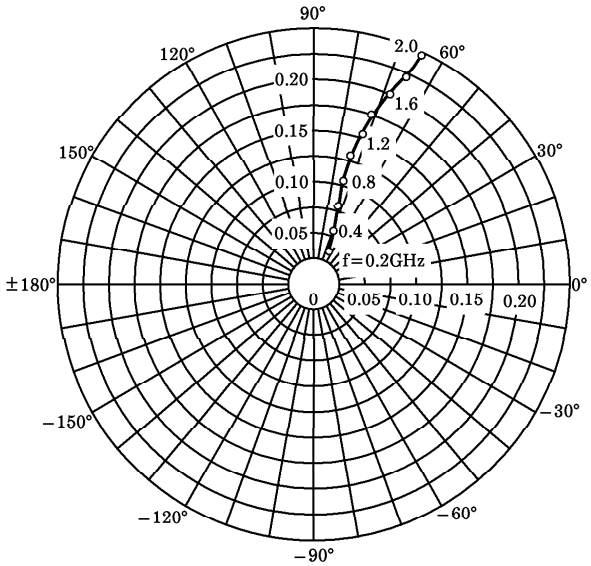
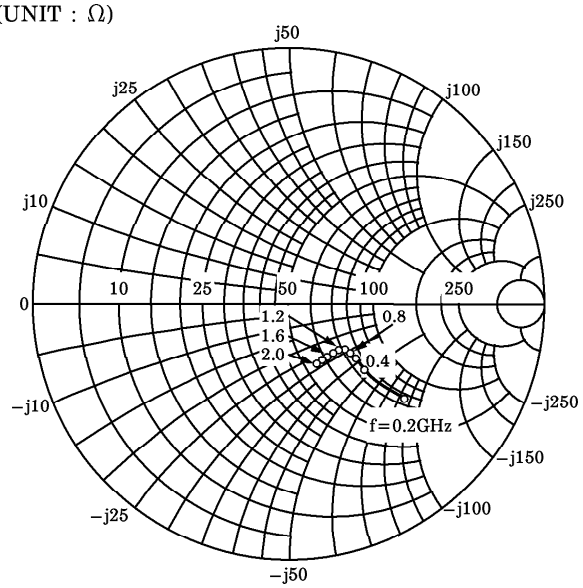
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